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Applicant(s): SALO, et al.  
Serial No.: Not yet assigned  
Filed: June 29, 2001  
Title: IMPROVEMENTS IN AND RELATION TO A  
BROADCAST NETWORK  
Group: Not yet assigned

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June 29, 2001

Sir:

Under the provisions of 35 USC 119 and 37 CFR 1.55, the  
applicant(s) hereby claim(s) the right of priority based on  
United Kingdom Patent Application No. (s) 0016065.5, filed  
June 30, 2000.

A certified copy of said United Kingdom Application is  
attached.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP

  
\_\_\_\_\_  
Robert M. Bauer  
Registration No. 34,487

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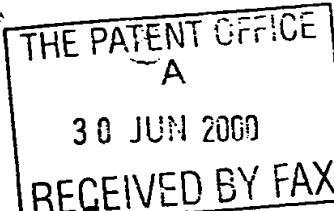
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1. Your reference

PAT 00106 GB

30JUN00 E549324-1 D02716  
P01/7700 0.00-0016065.5

2. Patent application number

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0016065.5

3. Full name, address and postcode of the or of each applicant (underline all surnames)

NOKIA OY  
KETTALAHDENTIE 4  
02150 ESPOO  
FINLAND

Patents ADP number (if you know it)

7504434001

If the applicant is a corporate body, give the country/state of its incorporation

FINLAND

4. Title of the invention

IMPROVEMENTS IN AND RELATING TO A BROADCAST NETWORK

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

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11. Name and daytime telephone number of person to contact in the United Kingdom

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DUPLICATE

PAT 00106 GB

**IMPROVEMENTS IN AND RELATING TO A BROADCAST NETWORK**

The present invention relates to the delivery of content over a broadcast network, particularly although not exclusively a broadband digital broadcast network.

Broadband digital broadcast networks are known in which video and audio data are transmitted to a users equipped with suitable receivers. One such well known network is the terrestrial Digital Video Broadcasting (DVB-T) system found in Europe and elsewhere where the video and audio data comprises a plurality of channels allowing the user to select from a range of content. It has also been proposed to utilise such networks not only for the transmission of video and audio data but also for the delivery of more general data types including IP/TCP data traffic.

The delivery of more general data types such IP data as may differ from the typical delivery of video and audio data in that rather than the network operator providing the same content to all users (broadcast), a specific user (unicast) or group of users (multicast) may require specific content. In order to deal with such a range of transmission scenarios, the addressing of content using conditional access has been proposed. Conditional access adds a unique, usually encrypted, identifier to content such that only a receiving terminal with the relevant decryption capability can receive the content.

Further details of Conditional Access in relation to DVB can be found in the following ETSI Publications DVB-CI Common Interface Specification for Conditional Access and other Digital Video Broadcasting Decoder Applications EN50221 (V1:02/97) and Guidelines for Implementation and Use of the Common Interface for DVB Decoder Applications R 206 001 (V1: 1998)

30 A025 (5/97).

However, although conditional access allow the addressing of an individual terminal or, indeed a group of terminals, it nevertheless remains necessary to transmit content using all the transmitters in the network irrespective of whether the content is included in a broadcast, multicast, or unicast.

5

According to a first aspect of the invention, there is provided a method for locating a terminal for delivery of content in a broadcast network comprising: associating the terminal with a transmitter operable in another network; interrogating the another network to determine the location of the transmitter; 10 and delivering the content to the terminal at the location of the transmitter.

According to a second aspect of the invention, there is provided a system for delivering content to a terminal in a broadcast network, the system comprising at least one terminal in a broadcast network, the terminal being associated 15 with a transmitter in another network, wherein the broadcast network includes a processor operable to interrogate the another network to determine the location of the transmitter and thereby deliver content to the terminal at the determined location.

20 According to a third aspect of the invention, there is provided an apparatus for delivering content to a terminal in a broadcast network comprising a processor operable to interrogate another network to determine the location of a transmitter associated with the terminal and deliver content to the terminal at the determined location.

25

The another network may be a public land mobile network. In which case, the transmitter associated with the terminal may be a mobile station. Thus, the terminal may be associated with a mobile station in the control of a single user. Consequently, the another network might make available, at the

request of the user, location details relating to the mobile station to the broadcast network.

According to another aspect of the invention, there is provided head end  
5 apparatus for use in a first multi-transmitter broadcast network, the apparatus comprising a terminal locator operable in response to a request to deliver content to a terminal in the first network to obtain terminal location information from a second, different network, a memory having stored therein transmitter location information and a controller operable in response to the request to  
10 transmit content to determine from the terminal and transmitter location information a suitable transmitter to deliver the content to the terminal.

Advantageously, as a result of the more effective utilisation of the transmitter network there is an improvement in service quality and spectral efficiency of  
15 the network. Such an improvement arises in the first case because the network can select a transmitter which meets the particular reception requirements for the Terminal receiving that content. Thus, where it is known that in a particular area there exist terrain features, for example, which dictate against the use of one transmitter in favour of another this information could  
20 be used in selecting a transmitter to transmit to a terminal in that area. In the second case, the ability to select a particular transmitter means that the frequencies previously used by the other transmitters to deliver that content are freed for other purposes. The apparatus may further include a router to route content to the suitable transmitter. The router may be responsive to  
25 data stored with content to be transmitted identifying the suitable transmitter.

According to another aspect of the invention, there is provided a terminal for use with a first multi-transmitter broadcast network, including a receiver operable to receive content transmitted by a selected one of a plurality of  
30 transmitters of the first network and a further transmitter connected to a

second network from which the first network derives information relating to the location of the further transmitter to facilitate selection of the one transmitter.

Conveniently, the further transmitter is integrated in the terminal. In this way, 5 the user can be certain that the content will be delivered to the correct location. Alternatively, the terminal may include an interface to permit connection to an external transmitter such as a mobile station of a cellular network. In either case, the further transmitter may also be used to provide a back or return channel which could be used to acknowledge delivery of 10 content to the terminal and might also be used to make requests for content. Where no such acknowledgement ability exists, the assumption is, of course, that the further transmitter is reasonably certain to be co-located with the terminal. Furthermore, a profile might be established for each terminal user which could be consulted by a service provider desirous of delivering content 15 to terminals of users likely to be interested in the content

According to still further aspect of the invention, there is provided a system for delivering content to a mobile terminal comprising a first broadcast network having a plurality of transmitters, and at least one terminal, the terminal 20 having a receiver for receiving content from the first network, and in proximity thereto a further transmitter connected to a second network from which the first network derives information relating to the location of the further transmitter, wherein the selection of a transmitter to deliver content to the terminal is made in accordance with the location information.

25

Whilst according to another aspect of the invention there is provided a method of delivering content using a suitable transmitter of a first broadcast network to a first terminal in proximity to a second terminal of a second network comprising deriving location information relating to the second terminal from

the second network and utilising that information in the selection of a suitable transmitter.

5 The selection of a suitable transmitter is preferably made based on the coverage pattern or footprint of the transmitter. Advantageously, where the position of the second terminal is insufficiently well defined to enable the selection of a particular transmitter from a plurality of potential suitable transmitters, delivery of the content is attempted via each of the potential transmitters in turn.

10

In order to aid in understanding the present invention, a particular embodiment thereof will now be described by way of example and with reference to the accompanying drawings, in which:

15 Figure 1 is a diagrammatic view of a digital broadcast network according to an embodiment of the present invention;  
Figure 2 is a more detailed diagrammatic view of the network of Figure 1;  
Figure 3 is schematic view illustrative of part of the method according to the invention; and

20 Figure 4 is a diagrammatic plan view of a transmitter coverage pattern generated by the network of Figure 1.

Referring to Figure 1, this shows a terrestrial digital video broadcast (DVB-T) network 1 having a plurality of transmitters 11a, 11b, 11c. A user equipped 25 with a suitable Digital Receiver (DR) hereinafter referred to as a terminal 3 incorporating a receiver 5, display 7 and user interface 9, can receive data broadcast by the network 1 from a transmitter 11 forming part of the network 1. The data broadcast by the transmitter 11 is derived from a variety of sources 13,15 via gateways 17,19 and may respectively include IP/TCP, 30 datagrams (UDP/IP) and Television content. Furthermore, as is becoming

increasingly common, the user is also in possession of a mobile station (MS) forming part of a Public Land Mobile Network (PLMN). The MS is interfaced with the terminal 3 over an infrared link 14.

- 5 Before transmission, the data received from a source 13,15 is processed in head-end equipment. As is well known in the art, the head end equipment places the data into MPEG-based data containers. To cater for the delivery of data to a particular terminal or group of terminals, the containers may also hold address information which can be identified and read by a conditional access component in the terminal do determine whether the data is intended for that terminal. The network 1 also provides the facility for suitably equipped terminals 3 to interact with the network 1. Thus, a user may request the delivery of a computer file via the network 1 to her terminal 3. Such functionality requires a return channel 23 from the terminal 3 to the DVB-T network 1 and a conditional access component in the terminal 3. The return channel 23 can be provided in the form of a dial-up connection using a modem function of the MS 12. The MS 12 which is connected to the terminal 3, establishes a connection over a telecommunications network 27 such as a PLMN and/or PSTN 27 to a subscriber management system (SMS) 29 (shown externally of network 1 for clarity only) of the DVB-T network 1. The subscriber management system 29 has connections to both the gateways 17,19 and the transmitter head-end equipment. It is thus possible for the user to issue a request for specific content via the user interface 9 of the terminal 3. The request is received by the SMS 29 which obtains the content from the relevant gateway 17,19 and passes it to the transmitter head-end for placing into data containers for onward transmission. It should be noted that the request from the user might include content which is not presently being transmitted by the network 1. To ensure that the user only receives the requested content, the data is broadcast with an identifier which the conditional access component in the terminal 3 recognises as being intended
- 10
- 15
- 20
- 25
- 30

for delivery to the user. In the event that the content is received by another terminal, the conditional access component of that terminal will prevent delivery of the content.

- 5 In the situation illustrated in the Figure 2, a user has requested via her return channel 23 a specific item of content  $R_c$ . The return channel 23 in this instance is provided by the MS 12 connected, in use, to the PLMN 27. In this instance, the user has requested using her terminal 3, a webpage made up of textual and graphical material, although the request could have been for a particular channel of television content. The request  $R_c$  from the user is passed via the IR link 14 to the MS 12 which connects via the PLMN 27 to the SMS 29 of the broadcast network 1, where it is identified as being a request for Internet content. The SMS 29 passes the request to the appropriate gateway, in this case the Internet gateway 17. This gateway 17 processes
- 10 the request  $R_c$  and retrieves the requested content  $C$ , from the Internet. The content  $C$ , which, as has already been explained, is made up of textual and graphical elements, is returned to the SMS 29. In the meantime, the SMS 29 attempts to identify firstly whether the terminal 3 for which the content is intended is mobile or fixed. Thus, the SMS 29 queries a database 30 to
- 15 obtain a user profile for the user identified in the request  $R_c$ . If the terminal 3 is found to be fixed then the content will be broadcast in the known manner. Otherwise, the SMS 29 seeks to determine from the request  $R_c$  whether it originated in the terminal 3 itself or from another external source such as a push from a advertiser or the like. Should the SMS 29 determine that the
- 20 request  $R_c$  has come from the terminal 3 then the SMS 29 will attempt to determine the calling line identity (CLI) of the MS 12 sending the request  $R_c$ . If the CLI is not available or alternatively the request originated externally as a push, the SMS 29 retrieves a mobile telephone number of a MS, which number has previously been supplied by the user for storage in the user
- 25 profile.
- 30

Referring particularly to Figures 3 and 4 this illustrates the coverage patterns and overlap of individual transmitters of a digital broadcast network (chain lines) and base stations of a Public Land Mobile Network (solid lines). Once the SMS has determined a number, a direct connection is then established to

5 a Home Location Register (HLR) 29 of a Public Land Mobile Network (PLMN) 27 identified as being the home network of the number found by the SMS 29. In response to a request 100 from the SMS 29, the PLMN 27 provides 110 an indication, if available, of the latest cell (LC) (shown hatched in Figure 3) in which the MS 12 corresponding to that identified from the CLI or failing that

10 the number stored in the user profile is located. The SMS passes the latest cell indication returned by the HLR together with the retrieved content C to a transmitter mapper 35. The transmitter mapper 35 identifies a transmitter 11a from those in the network 1 whose footprint (FP) includes most, if not all, of the latest cell (LC) identified by the HLR 29. The mapper 35 may carry out

15 the identification of the most suitable transmitter using a look-up table in which cells of the PLMN 27 are cross-referenced with a suitable transmitter, for example. This information is then attached to the content C, the latter having been encrypted as an MPEG-2 data stream before both the transmitter and content information are passed to a router 37. The router 37 retrieves the

20 information identifying the transmitter assigned to the content C by the transmitter mapper and passes the content C it to the appropriate transmitter 11a for transmission 120. The user's terminal 3, which hopefully has remained within the footprint  $FP_a$  of the transmitter, is then able to receive the content C.

25

Optionally, where the terminal 3 is provided with a return channel 23 via the MS 12, this can be utilised in the generation of a delivery status report 130. Such an acknowledgement is not, however, a requirement, it being assumed with a reasonable probability that a user will be carrying her MS 12 along with

30 her terminal 3. However, where acknowledgement is possible and desirable

the status report 130 is passed 140 over the return channel 23 via the PLMN 27 to the SMS 29 and contains confirmation of whether the content C has reached the terminal 3 successfully. Where the request  $R_c$  was originated in the terminal 3 and in the event that the content C does not reach the terminal 3 within a pre-determined period, the terminal 3 will generate a report indicating that no delivery has taken place. Otherwise, where the request was originated in the terminal 3 and their followed successful reception of the content C, a corresponding report will be made. In the event that the SMS 29 receives a report of unsuccessful delivery then the SMS 29 will first attempt to 10 re-send the content C. Thus, the SMS will first update the MS 12 location from the HLR 3. Should this update reveal that the MS 12 remains in the same cell, it may be that the MS 12 is within a region of the cell covered by a different transmitter footprint FP. Thus, whilst the update continues to indicate the same location cell, the SMS will instruct the mapper 35 to provide details 15 of each transmitter covering at least part of that cell so that content C may be sent by that transmitter. Otherwise, if the terminal has moved to a cell covered by a different transmitter footprint FP, that transmitter 11 will be used to deliver the content. However, in the event that the above described re-sends fail after a pre-determined number attempts, the content will be 20 transmitted over all the transmitters in the network.

In another embodiment of the invention, particularly suitable to a situation where the overlap of the transmitter footprints FP do not correspond closely to the underlying cell structure of the PLMN 27, a different method of obtaining 25 the location of the MS 12 is employed. In this case, instead of the SMS 29 obtaining the latest cell information from the HLR 31, the SMS requests the PLMN 27 to carry out a location update using a more precise positioning method such as base station triangulation or GPS. Particularly in the case where a MS 12 is located in a cell LC which is covered by separate 30 transmitter footprints FP, the more accurate positioning information obtained

in this way should allow the transmitter mapper 35 to direct the content C to the transmitter most likely to deliver the content to the terminal 3.

It will be further appreciated that the terminal 3 may incorporate a mobile station 12 rather than rely on the presence of an MS 12 in close proximity to the terminal 3 to provide the location information. By having the MS 12 incorporated in the same housing as the terminal 3 the user would both have less items of equipment to carry and also could be assured that the terminal 3 was always co-located with the mobile station 12 or, indeed another 10 communications device which provides the positioning information for use by the network. In addition, the integrated MS 12 could be employed to provide a return channel 23 in the same manner that an independently carried MS 12 could be interfaced to the terminal 3 to facilitate the option of a return channel 23.

15

Furthermore, it will be clear that although in the above embodiment the Return Channel 23 is provided over the same network, namely the PLMN 27, as is used to derive the location information, a separate return channel using a different bearer could be employed. Indeed, as has already been stated, the 20 request for content need not originate with the terminal 3. For example, an advertiser or service provider may wish to push particular content to a certain user or group of users perhaps located in a certain area relevant to the content being pushed.

Claims:

1. A method for locating a terminal for delivery of content in a broadcast network comprising:
  - 5 associating the terminal with a transmitter operable in another network interrogating the another network to determine the location of the transmitter; and delivering the content to the terminal at the location of the transmitter.
- 10 2. A system for delivering content to a terminal in a broadcast network, the system comprising at least one terminal in a broadcast network, the terminal being associated with a transmitter in another network, wherein the broadcast network includes a processor operable to interrogate the another network to determine the location of the transmitter and thereby deliver content to the terminal at the determined location.
- 15 3. Apparatus for delivering content to a terminal in a broadcast network comprising a processor operable to interrogate another network to determine the location of a transmitter associated with the terminal and deliver content to the terminal at the determined location..
- 20 4. A head end apparatus for use in a first multi-transmitter broadcast network, the apparatus comprising a terminal locator operable in response to a request to deliver content to a terminal in the first network to obtain terminal location information from a second, different network, a memory having stored therein transmitter location information and a controller operable in response to the request to transmit content to determine from the terminal and transmitter location information a suitable transmitter to deliver the content to the terminal.

5. An apparatus as claimed in Claim 4, further including a router connectable to a plurality of transmitters and operable to deliver the content to the suitable transmitter.

5 6. A terminal for use with a first multi-transmitter broadcast network, including a receiver operable to receive content transmitted by a selected one of a plurality of transmitters of the first network and a further transmitter connected to a second network from which the first network derives information relating to the location of the further transmitter to facilitate  
10 selection of the one transmitter.

7. A terminal as claimed in Claim 6, wherein the further transmitter provides a back channel to send a request for specific content to the first network.

15

8. A terminal as claimed in Claim 6 or Claim 7, wherein the further transmitter is included in a mobile station interfaced with the terminal.

20 9. A system for delivering content to a mobile terminal comprising a first broadcast network having a plurality of transmitters, and at least one terminal, the terminal having a receiver for receiving content from the first network, and in proximity thereto a further transmitter connected to a second network from which the first network derives information relating to the location of the further transmitter, wherein the selection of a transmitter to deliver content to  
25 the terminal is made in accordance with the location information.

10. A system as claimed in Claim 9, wherein the further transmitter is integrated with the terminal.

11. A system as claimed in Claim 9 or Claim 10, wherein the second network is a public land mobile network.
12. A system as claimed in Claim 11, wherein the location information is derived from a Home Location Register of the public land mobile network.
13. A system as claimed in Claim 11, wherein the location information is derived by base station triangulation.
- 10 14. A system as claimed in any one of Claims 9, 10 or 11, wherein the further transmitter provides location information.
- 15 15. A system as claimed in Claim 14, wherein the location information is obtained from a global positioning system receiver.
16. A method of delivering content using a selected transmitter of a first broadcast network to a first terminal in proximity to a second terminal in a second network comprises deriving location information relating to the second terminal from the second network and utilising that information in the selection of a suitable transmitter.
17. A method as claimed in Claim 16, wherein the location information is derived by consulting a Home Location Register of the second network.
- 25 18. A method as claimed in Claim 16, wherein the location information is derived from co-ordinates transmitted by the second terminal.

**ABSTRACT**Improvements in and relating to a broadcast network

5 A broadcast network 1 is described in which to improve network efficiency and quality of service, a particular transmitter 11a within the network 1 is selected to transmit content to a particular, preferably mobile terminal 3. The selection of the transmitter 11a is carried out by reference to information available in a second network 27, the user of the terminal 3 having a further terminal 12  
10 connected to the second network 27 and either integrated with or in close proximity to their mobile terminal 3.

(Fig. 1)

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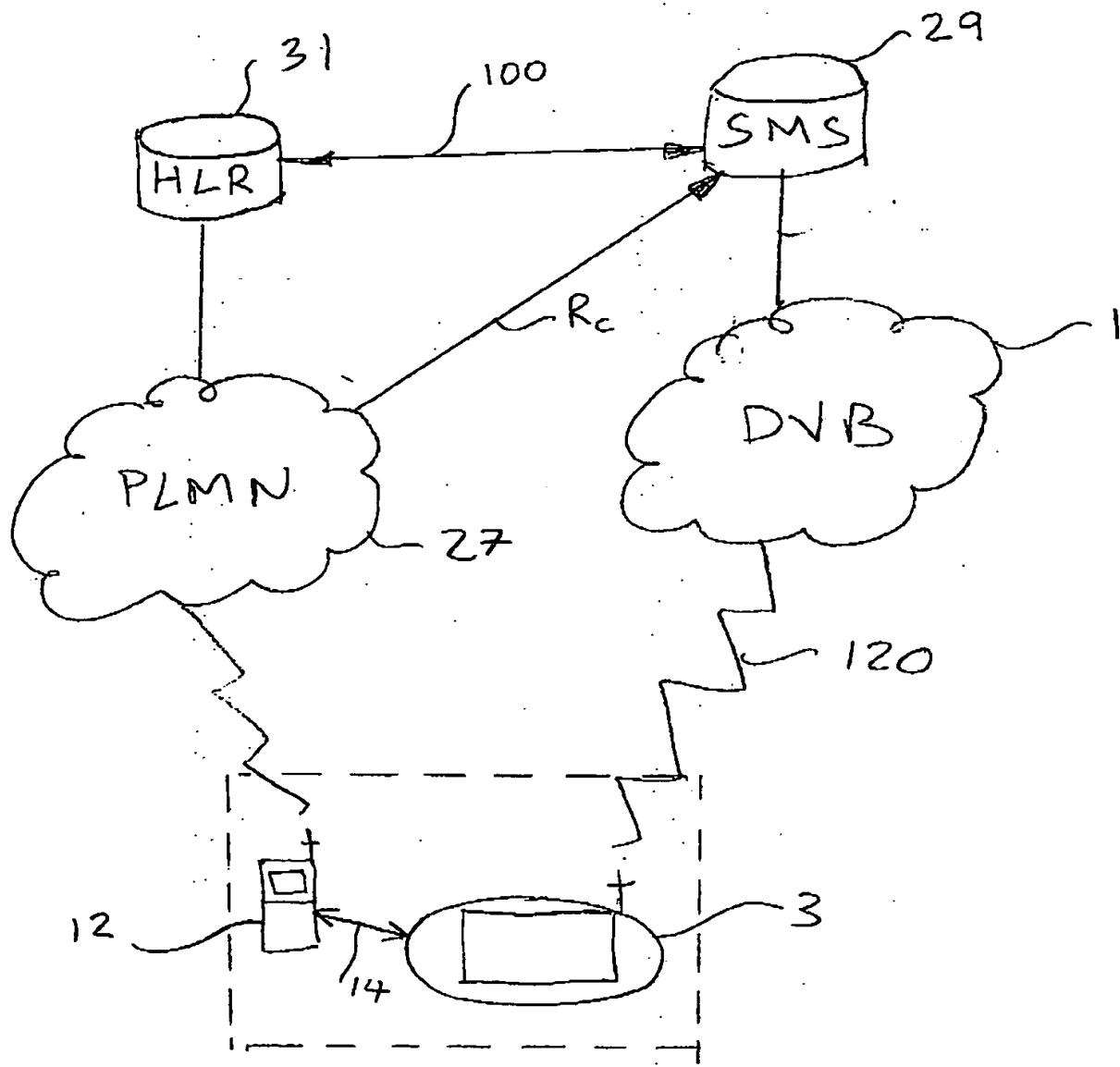


Figure 1

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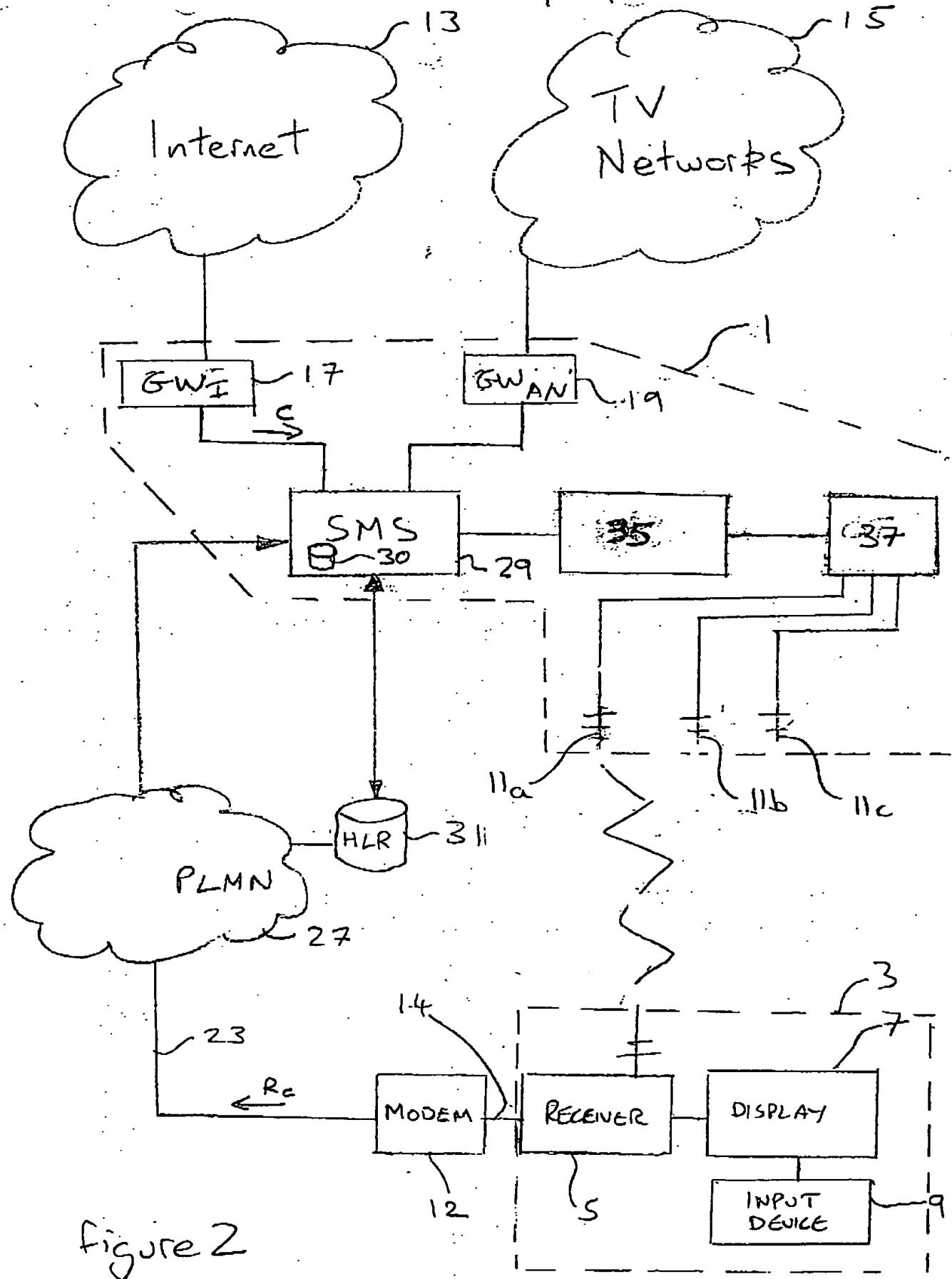


figure 2

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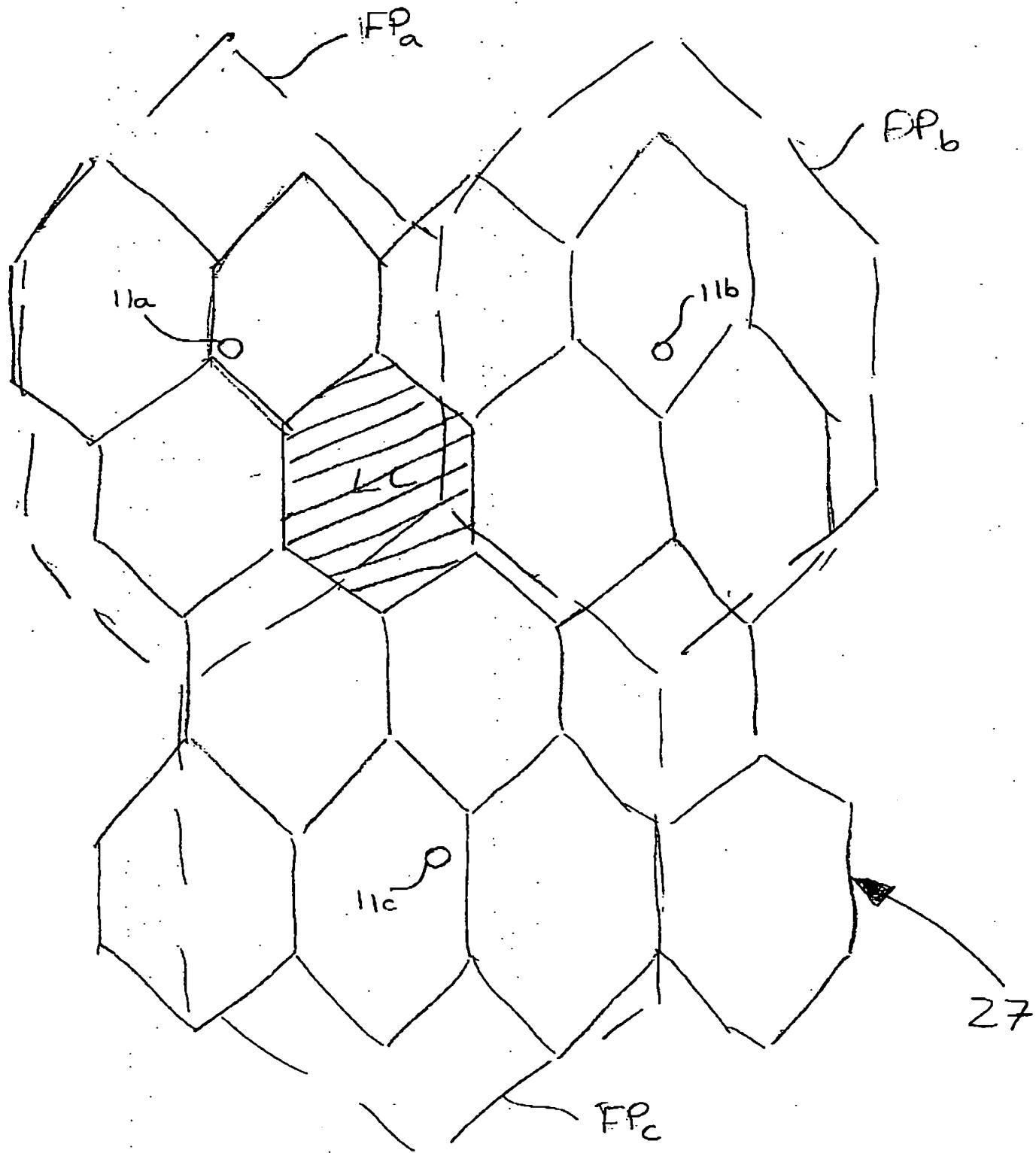


Figure 3

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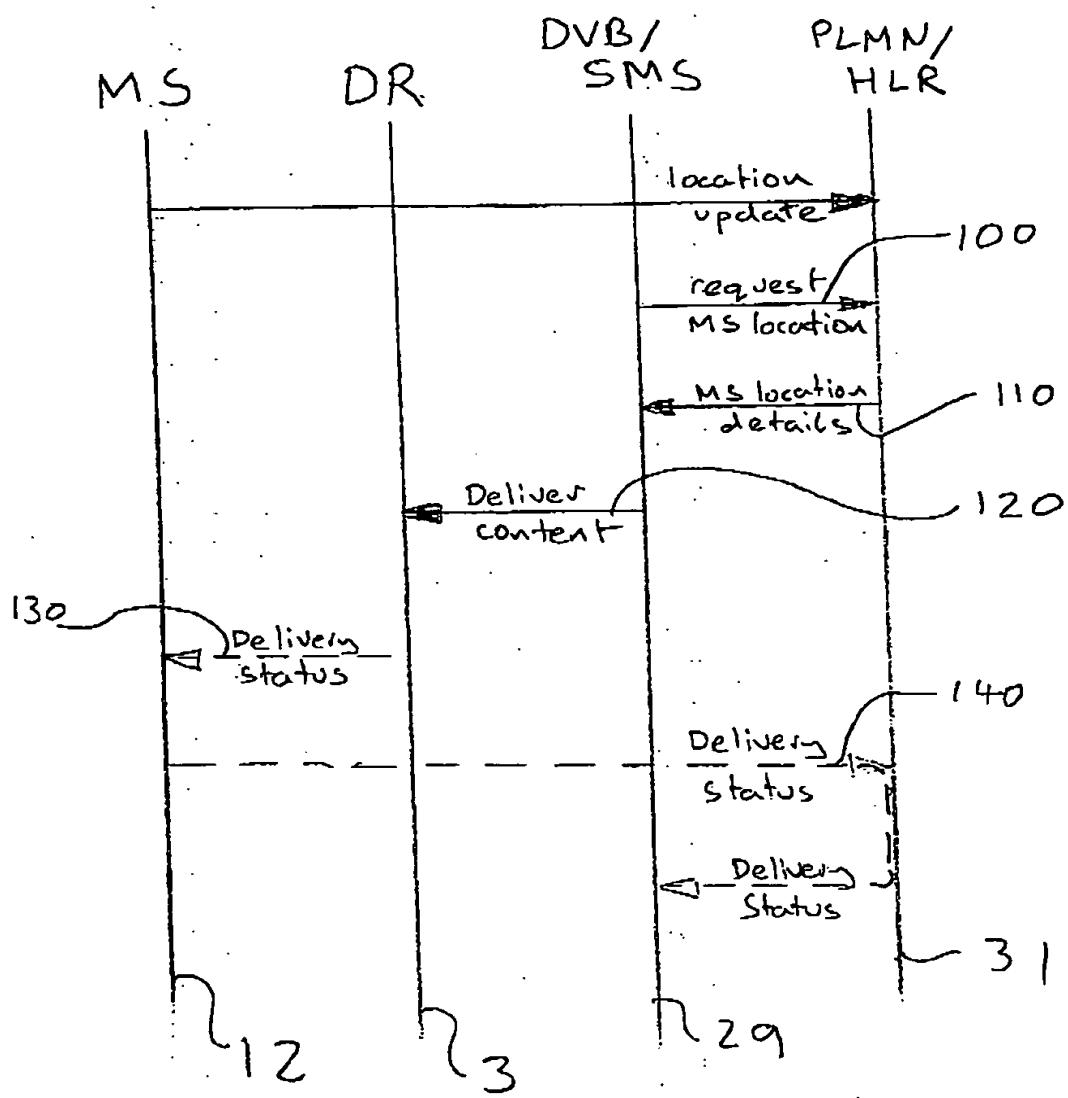


Figure 4

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